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## **(54) EMULSIFIED COMPOSITION AND DRINK RICH IN DOCOSAHEXAENOIC ACID**

(57)Abstract:

PURPOSE: To obtain a stable emulsified composition containing an oil and fat having high docosahexaenoic acid content, sucrose diacetate hexaisobutyrate, a polyglycerol fatty acid ester and a polyhydric alcohol under specific condition and free from fishy smell, etc.

CONSTITUTION: This emulsified composition can be produced by mixing (A) an oil and fat rich in docosahexaenoic acid with (B) sucrose diacetate hexaisobutyrate at a ratio to attain a prescribed specific gravity, dissolving 1 pt.wt. of the obtained mixture in about 2-50 pts.wt. of a solution (containing about 0.8-10wt.% of water) produced by mixing and dissolving (C) a polyglycerol fatty acid ester having an HLB of  $\geq 10$  in (D) a polyhydric alcohol having a water-content of  $\leq 50\%$  and emulsifying the obtained mixture. A health drink stably preservable over a long period and free from disagreeable taste and smell can be prepared by adding e.g. about 0.02-2wt.% of the obtained emulsified composition to a fruit juice drink, etc.

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3. In the drawings, any words are not translated.

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**CLAIMS**

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[Claim(s)]

[Claim 1](1) Docosahexaenoic acid quantity content fats and oils, (2) shook sirloin diacetatehexaiso butyrate (SAIB), (3) Ten or more HLB polyglyceryl fatty acid ester and a polyhydric alcohol class of 50% or less of (4) water content, a docosahexaenoic acid quantity content emulsifying composition characterized by a thing, \*\* and others.

[Claim 2](1) Docosahexaenoic acid quantity content fats and oils, (2) shook sirloin diacetatehexaiso butyrate (SAIB), (3) A drink, wherein ten or more HLB polyglyceryl fatty acid ester and a polyhydric alcohol class of 50% or less of (4) water content, and a docosahexaenoic acid [ \*\* and others ] quantity content emulsifying composition are blended.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention the emulsifying composition and this containing docosahexaenoic acid (it omits the following DHA) with few different tastes stable for a long period of time and nasty smells about the drink to blend in more detail, (1) Docosahexaenoic acid quantity content fats and oils, (2) shook sirloin diacetatehexaiso butyrate (SAIB), (3) It is related with the drink which blends the DHA quantity content emulsifying composition and this which are characterized by ten or more HLB polyglyceryl fatty acid ester and the polyhydric alcohol class of 50% or less of (4) water content, and the thing, \*\* and others.

[0002]

[Description of the Prior Art] DHA is a higher unsaturated fatty acid contained mostly in fish oil with eicosapentaenoic acid (it abbreviates to EPA below). DHA and EPA are counted from the methyl group (neutral end) side of fatty acid, and are called the omega-3 fatty acid in which a double bond begins from the 3rd carbon atom, and, naturally, in addition to this, omega-6 and omega-9 fatty acid also exist. As for omega-3 fatty acid, the physiological function attracts attention and many researches are advanced. As for omega-3 fatty acid, physiological functions, such as a cholesterol fall, thrombus

prevention, and a \*\* cancer operation, are pointed out. In the latest research, the physiological function which is not in other omega-3 fatty acid, such as improvement in the memory and learning ability of DHA and development of an infantile brain, is pointed out. The method by which development of the effective purification method is behind compared with EPA, and most former was discarded, It is discovered that 30 to 40% of DHA is contained in the eye socket fat which exists in the head (kila) of a tuna, This was made into the raw material, and after production of the DHA quantity content fats and oils pass purification processes, such as decolorization and deodorization, and crystal removal (wintering) at -20--40 \*\*, was started, the application examination came to be performed actively.

[0003]Some proposals which use these effects under such a background are made. For example, the health food which consists of more than a kind at least among DHA extracted and separated from fishery animals and plants or its glyceride, and these derivatives (JP,57-169416,A), the stable EPA enriched food (JP,63-5064,B) of EPA without \*\*\*\* containing marine chlorella powder, and the increase of the ease of dealing with it -- oxidation, in order to strengthen the receiving stability, Powder and its manufacturing method (JP,2-305898,A) of the higher unsaturated fatty acid content fats and oils which used and emulsified the partial decomposition product of milk protein, such as casein, to the higher unsaturated fatty acid, The fat infusion solution which has the anti-thrombus nature which used together fish oil containing vegetable oil, EPA, and/or its glyceride, and has improved nutritional balance (JP,3-49890,B), A manufacturing method of the functional food which added lactic acid bacteria or/and yeast and fermented in order to improve an unpleasant fish oil smell (JP,3-72264,B), % [ EPA10/ more than ] it is mainly concerned with refining fish oil or this -- hydration protein is added in the included fats and oils, and the manufacturing method (JP,5-989,B) etc. of manufacturing an oil-in-water type emulsified matter and the EPA enriched food which mixes this for foodstuffs are proposed.

[0004]However, it remains as it is, or adds for foodstuffs with the gestalt of a capsule and powder, and many of above-mentioned proposals take in DHA. Although the proposal which carries out addition mixing and is taken in for foodstuffs as an emulsified matter is also seen, The thing using lactalbumin and hydration protein as an emulsifier has a problem which forms a precipitate in an acidic beverage, When the emulsified matter using lecithin is added to a drink, for example, there is a fault that lecithin itself has a different clever nasty smell, and there are many issues which should be solved in applying development of a DHA emulsifying composition and this compound without a different clever nasty smell to a drink including an acidic beverage by stability for a long period of time.

[0005]How to emulsify oily matter in water or polyhydric alcohol, using polyglyceryl fatty acid ester as another proposal (JP,56-37040,A), Edible oiliness materials, such as natural essential oils, flavors, and animal-and-vegetable-oils fat, shook sirloin diacetatehexaiso butyrate, Although there is a proposal of the emulsifying composition for acidic beverages (JP,5-27376,B) obtained by emulsifying with eight or more HLB polyglyceryl fatty acid ester and the polyhydric alcohol class of 50% or less of water content, about the DHA emulsifying composition without \*\*\*\*, neither indication nor suggestion is carried out at all.

[0006]In all these proposals, it is not indicated at all about the drink containing the

emulsifying composition and this compound of refined oil fat which contain the DHA quantity content fats and oils and/or DHA which are produced by refining the eye socket fat of a bonito and a tuna not less than 20%.

[0007]

[Problem(s) to be Solved by the Invention]Paying attention to the various function nature of DHA, there is no \*\*\*\* and other different clever nasty smell, and the application development to various kinds of drinks including development of a stable DHA quantity content emulsifying composition and the acidic beverage of this constituent is demanded strongly for a long period of time.

[0008]

[Means for Solving the Problem]Then, this invention persons inquired wholeheartedly, in order to solve a fault of many like the above.As a result, refined oil fat which contains DHA quantity content fats and oils and/or DHA which used an eye socket fat of a bonito and a tuna as a raw material, and were refined highly not less than 20% is used as a fats-and-oils material, An emulsified matter which emulsified by having added ten or more HLB polyglyceryl fatty acid ester and a polyhydric alcohol class of 50% or less of water content, and adjusted specific gravity by SAIB further, There are no different clever nasty smells, such as \*\*\*\*, it is stability for a long period of time, facts including an acidic beverage that it is very stable in a drink are found out further, and it came to complete this invention.

[0009]According to this invention, DHA quantity content fats and oils are emulsified in this way by adding a polyhydric alcohol class of ten or more HLB polyglyceryl fatty acid ester and 50% or less of water content, A drink which blends a DHA quantity content emulsifying composition and this which are obtained by adjusting specific gravity by SAIB is provided. Hereafter, this invention is described still in detail.

[0010]DHA quantity content fats and oils produced by refining an eye socket fat which exists in a head (kiln) of a bonito and a tuna which it was [ most being discarded until now as DHA quantity content fats and oils used in this invention, or only being used for feed etc. and ] can be illustrated. As a refining method of this eye socket fat, an extracted eye socket fat can be heated, for example, what separated oil can be decolorized and deodorized by activated carbon treatment, and it can carry out through processes, such as removing a crystal thing at -20--40 \*\* (wintering). a DHA content of an eye socket fat -- a tuna -- about 20- about 30% and a bonito -- about 30- DHA quantity content fats and oils which are about 45% and are produced by processing this -- respectively -- about 30-about 40% and about 35- a DHA content is raised to about 50%. DHA quantity content fats and oils produced by generally refining an eye socket fat of a bonito and a tuna contain about 25 - DHA of 40% (W/W) of abbreviation.

[0011]Fish oil furthermore obtained from fish, such as raw materials other than an eye socket fat of a bonito and a tuna, for example, a bonito, a tuna, a sardine, and a mackerel, with bony parts of a fish is used as a raw material, A purification method by physical separating mechanisms, such as distillation, fractional crystallization, and chromatography; This fish oil is mixed with a silver nitrate solution of not less than 60% of concentration, A purification method by a chemical means of distinguishing from other fatty acid using unity with silver of DHA; Fish oil which raised a DHA content to not less than 20% by a method of raising a DHA content in triglyceride by an ester exchange reaction by lipase, etc., these arbitrary mixtures, etc. It can be used as DHA

quantity content fats and oils in this invention. What contains a DHA content not less than about 35% preferably more than about 20% (W/W) is preferred for DHA quantity content fats and oils which carry out a deer and are used in this invention.

[0012]As polyglyceryl fatty acid ester which can be used by this invention, For example, ester of with an average degree of polymerization [ of three or more ] polyglycerin, and with a carbon numbers of eight or more fatty acid, For example, it is decaglycerin monooleate, deca glycerol monostearate, decaglycerin monopalmitate, the decaglycerin MONOMIRI State, etc., and HLB can mention about 12 - about 14 thing within the limits preferably about ten or more. It is difficult to prepare emulsification particles whose particle diameter it is uniform and is small, when ten or less HLB polyglyceryl fatty acid ester is used, and an emulsified matter is unstable, and when adding to a drink, a tendency to cause separation phenomena, such as precipitate and oil separation, is strong. generally the amount of the polyglyceryl fatty acid ester used receives fats-and-oils material 1 weight section -- about 0.05 weight section - within the limits of about 0.15 weight sections - about 0.3 weight sections can be illustrated preferably about 0.5 weight sections.

[0013]As a polyhydric alcohol class which can be used by this invention, sugars, such as glycerin, propylene glycol, sorbitol, maltitol, an amylolysis reduction thing, glucose, sucrose, and malt sugar, and two or more sorts of these mixtures can be illustrated, for example. As for these polyhydric alcohol classes, it is preferred that they are 50% or less of water content, especially about 0 to 25%, and when it is more than this, there is a fault in which antiseptis is lost. Within the limits of about 1 weight section - about 10 weight sections especially about 1.5 weight sections - about 5 weight sections is usually preferred for the amount used to fats-and-oils material 1 weight section.

[0014]as SAIB which can be used in this invention for specific gravity regulation -- for example -- the specific gravity -- about 1.13 - about 1.19 range -- SAIB of about 1.14 - about 1.15 range can be illustrated preferably. receiving fats-and-oils material 1 weight section generally, although the amount used is changeable according to specific gravity of SAIB to be used, and specific gravity which an emulsifying composition is expected -- about 0.2 weight section - within the limits of about 0.4 weight sections - about 0.6 weight sections can be illustrated preferably about 0.8 weight sections.

[0015]If one desirable embodiment of the method of preparation of an emulsifying composition of this invention is illustrated, \*\*\*\* DHA quantity content fats and oils and SAIB which were first described above will be mixed, for example, it will dissolve at a room temperature thru/or temperature of about 180 \*\*, and will be considered as a uniform mixed oil. The mixing ratio of DHA quantity content fats and oils in that case and SAIB can be chosen so that it may agree for specific gravity of a drink which is going to add a constituent after emulsification.

[0016]Mixed oil 1 weight section obtained in this way is mixed with the polyhydric alcohol solution 2 [ about ] which carried out the mixture solution of the polyglyceryl fatty acid ester - about 50 weight sections (moisture content about 0.5- about 10 % of the weight), for example, Particle diameter 0.2 [ about ] - emulsified liquid of 1 micro of abbreviation which was very detailed and was excellent in stability can be obtained by carrying out emulsification using a homomixer, a colloid mill, a high voltage homogenizer, etc.

[0017]It adds to the above-mentioned polyhydric alcohol solution by request at

polyglyceryl fatty acid ester, Hydrophilic surfactants, such as sucrose fatty acid ester and a sorbitan fatty acid ester; Gum arabic, Protein, such as nature, such as tragacanth gum, xanthan gum, and CMC, and synthetic stabilizer; gelatin, and casein; further, organic acid, such as lactic acid, citrate, malic acid, and tartaric acid, can also be added in order to raise preservability. On the other hand, addition mixing of the oleophilic emulsifier like a glycerine fatty acid ester and a sorbitan fatty acid ester can also be beforehand carried out by request at said DHA quantity content fats and oils.

[0018]According to this invention, a constituent which are obtained by carrying out like the above by blending with a drink, for example, a fruit-juice drink, a fermentation milk beverage, a fizzy drink, etc. abbreviation 0.02- about 2% of the weight, for example, A health drink which can expect physiological functions, such as improvement in a cholesterol fall which originates in DHA without a different clever nasty smell by stability for a long period of time, thrombus prevention, and mneme and learning ability, is obtained.

[0019]Next, an example is given and this invention is explained still more concretely.

[0020]

[Example]

The mixture solution of the 135% of example DHA content refining fish oil 100g, the lemon oil 20g, SAIB134g, and 1 g of the natural vitamin E was carried out, and the uniform oily material mixture ( $d_{20}^{20}1.03$ ) was obtained. After carrying out preliminary churning of the glycerin 615g, 60g of decaglycerin mono- olate (HLB12), and the water 135g in addition to the solution which carried out the mixture solution and distributing this mixture, T.K. It emulsified for 10 minutes at 5000 rpm using the homomixer (product made from special opportunity-ized industry), and particle diameter 0.3 [ about ] - the uniform emulsifying composition of 0.5 micro of abbreviation were obtained (this invention article No.1).In comparative example 1 Example 1, changed to 60 g of decaglycerin monooleate (HLB12), and 60 g of sucrose fatty acid stearic acid ester (HLB15) was used, and also the emulsified matter was obtained by the same conditions as Example 1 (comparison article No.1).

[0021]After dissolving the example 2 granulated sugar 240g, 8g of citrate, and 0.5 g of vitamin C in optimum dose of water and adjusting the pH to 3.0 with sodium acid citrate, the whole was 2 l. and the syrup for acidic beverages was prepared. 0.2 ml was added, respectively, the emulsified matter obtained each by 200 ml of this syrup by Example 1 and the comparative example 1 was capped after filling up a bottle, it cooled after sterilization for 15 minutes at 85 \*\*, and the drink was obtained.

[0022]The mixture solution of the 325% of example DHA content refining fish oil 100g, 20 g of limonene, SAIB134g, 1g of natural vitamin E, and the rosemary extract 0.5g was carried out, and the uniform oily material mixture ( $d_{20}^{20}1.03$ ) was obtained. After carrying out preliminary churning of the glycerin 630g, 60g of deca glycerol monostearate (HLB12), and the water 120g in addition to the solution which carried out the mixture solution and distributing this mixture, preliminary emulsification is carried out for 5 minutes at 5000 rpm using a T.K. homomixer. By the pressure type homogenizer of two step types, it emulsified on condition of 200 kg per step /  $\text{cm}^2$ , and the second step of 50 kg /  $\text{cm}^2$ , and this was \*\*\*\*\* (ed) further once again, was emulsified, and particle diameter 0.1 [ about ] - the uniform emulsifying composition of 0.3 micro of abbreviation were obtained (this invention article No.2).

. In comparative example 2 Example 3, changed to 60 g of deca glycerol monostearate (HLB12), and the purified soybean lecithin 20g was used, and also the emulsified matter was obtained by the same conditions as Example 3 (comparison article No.2).

[0023]After dissolving in optimum dose of water and adjusting the example 4 granulated sugar 160g and 150 g of coffee extraction things (Bx.20") the pH to 5.5, the whole was 2 l. and neutral bevel-use syrup was prepared. 0.2 ml was added, respectively, the emulsified matter obtained each by 200 ml of this syrup by Example 3 and the comparative example 2 was capped after filling up a bottle, it cooled after sterilization for 15 minutes at 85 \*\*, and the drink was obtained.

[0024]Settlement preservation of the drink obtained in reference example 1 Example 2 was carried out for three months at the room temperature, and aging of appearance was compared. The result is shown in Table 1.

[0025]

[Table 1]

table 1 preservation days seven days -- 14 day 30-day 90-day comparison article No.1 ++  
++ +++ ++++ this invention article No.1 - - - Each sign -, however in front has a following  
meaning. [ ]

[0026]- Generating of a neck ring is not accepted.

[0027]\*\* neck ring is accepted slightly.

[0028]+ Accept a clear neck ring.

[0029]+ + A remarkable neck ring is accepted.

[0030]+ ++ It becomes so intense that a neck ring becomes stratified.

[0031]In three months, this invention article No.1 is completely stable, and a passage clear from the result of Table 1 precipitates, Comparison article No.1 generated the remarkable neck ring in one week to there being no phase separation of condensation, a neck ring (phenomenon which oil dissociates and floats to ring shape at an oil level), etc., and having held the good emulsified state, and the emulsified state was unstable.

[0032]The emulsifying composition 20g obtained in reference example 2 Example 1 was put into 50-ml glassware, and the size of particles was observed under the microscope after 5-hour shake after sealing and in 35 \*\* humidistat by a part for the amplitude of 70 mm, and 120/of number of times of shake. The result is shown in Table 2.

[0033]

[Table 2]

Table 2: Particle diameter comparison article No.1 after particle diameter shake  
immediately after stability (microscope observation) preparation of emulsifying  
composition 0.3-3micro 0.3 - 5micro this invention article No.1 As 0.3-0.5 micro being  
shown in the result of the 0.3-0.5micro table 2, 0.3-the range of the particle diameter immediately after preparation were 0.5micro this invention article No.1, and the size of particles was uniform. Change of particle diameter did not have after shake and it was stable. On the other hand, comparison article No.1, 0.3-the range of the particle diameter immediately after preparation are 3micro, and variation was looked at by the size of particles. The particle diameter after shake of an emulsified state -- the tendency for variation to become still larger by condensation of 0.3-5micro, and particles is seen -- was also unstable.

[0034]The drink obtained in reference example 3 Example 4 was saved for 14 days at a room temperature and 40 \*\*, and aging of flavor was observed sensuously. The result is

shown in Table 3.

[0035]

[Table 3]

Table 3: Time of aging (organic-functions evaluation) preservation days preparation  
which is flavor . Three day seven-day 14-day comparison article No.2(room temperature  
preservation) \*\* + + + + Comparison article No.2(40 \*\* preservation) \*\* + + + + + + This  
invention article No.2 (room temperature preservation) - - - - This invention article No.2  
(40 \*\* preservation) - - Each sign - \*\*, however in front has a following meaning.

[0036]- A different clever nasty smell is not accepted.

[0037]A \*\* different clever nasty smell is accepted slightly.

[0038]+ A little unpleasant different clever nasty smell is accepted.

[0039]+ + Quite unpleasant different clever nasty smell and \*\*\*\* are accepted.

[0040]+ + + A remarkable unpleasant different clever nasty smell and \*\*\*\* are accepted.

[0041]Although the different clever nasty smell was slightly accepted by 40 \*\*  
preservation 14 days afterward [ 2 / this invention article No.] as for the passage clear  
from the result of Table 3, in room temperature preservation, the different clever nasty  
smell was not accepted at all. On the other hand, the different taste which originates in  
lecithin at the time [ 2 / comparison article No./ case / any / of room temperature  
preservation and 40 \*\* preservation ] of preparation was accepted slightly, after that,  
temporally, the different clever nasty smell became strong and generation of \*\*\*\* was  
also seen.

[0042]

[Effect of the Invention]According to this invention, it is very useful that manufacture of  
a stable DHA quantity content fats-and-oils emulsifying composition and a drink without  
a different clever nasty smell and \*\*\*\* is attained, and the use to a wide range of fields,  
such as health food and a drink, opens etc.

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[Translation done.]